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A new Bornean species of *Colocasia* Schott (*Araceae : Colocasieae*), with a synopsis of the genus in Malesia and Australia

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Summary. A synopsis, with key and illustrations, is given of the three species of *Colocasia* (*keladi*, taro) in Malesia and Australia. One, *C. oresbia* A. Hay (Borneo), is new to science. Infraspecific taxa in the Common Taro, *C. esculenta* (L.) Schott, are no longer recognized for either cultivated or wild forms. Krause's confused interpretation of *C. indica* (Lour.) Kunth, in which the current concepts of *Alocasia macrorrhizos* (L.) G. Don and *C. gigantea* (Bl.) Hook.*f.* were partly combined, is clarified. Eighteen binomials and trinomials in *Colocasia* are excluded from the genus. Features are given distinguishing *Colocasia* from *Alocasia* with which it is often confused.

Colocasia is a small, mainly Asian genus of herbs considered to be allied to other Old World, predominantly Asian, genera including *Protarum* Engl. (Seychelle Islands), *Steudnera* K. Koch (Himalaya and Indochina), *Remusatia* Schott (incl. *Gonatanthus* Klotszch (Li & Hay 1992); centred on eastern Himalaya/South East Asia/southern China but distributed to tropical Africa and tropical Australia) and *Alocasia* (Schott) G. Don (Indomalesia to East Asia and warm temperate Australia), all in the tribe Colocasieae (*sensu* Grayum 1990, Hay & Mabberley 1991: Colocasieae *sensu* Bogner & Nicolson (1991) includes only *Alocasia* and *Colocasia*, other above-mentioned genera being placed in allied tribes).

Colocasia is generally thought to be most closely related to, and in Malesia is most often confused with, *Alocasia*. They may be distinguished by the inflorescences arising in a centrifugal sequence radial to the stem in *Colocasia*, while the inflorescences in *Alocasia* are generally paired with each pair orientated more or less tangential to the stem (this arrangement is sometimes somewhat obscured in cases where many inflorescence pairs are produced sequentially without interruption by foliage leaves, e.g., in *A. portei* (Schott)

Becc. & Engl. and *A. scabriuscula* N.E. Br., but a linear radial sequence is not observed). The two genera may be separated on the occurrence of large numbers of ovules on parietal placentas in the ovaries of *Colocasia*, smaller numbers on basal placentas in *Alocasia* and large numbers of very small seeds in *Colocasia* and smaller numbers of much larger seeds in *Alocasia*. Scattered interpistillar staminodes are often found in *Colocasia*, but are not yet recorded in *Alocasia*. *Colocasia* always has peltate leaves which are usually waxy-glaucous while *Alocasia* species usually have non-peltate leaves (though the seedlings are almost always peltate-leaved). Peltate leaves in *Alocasia* display a variety of metallic, rugose, hairy or bullate surfaces, but they are never waxy-glaucous except in *Alocasia robusta* M. Hotta (Sarawak to Sabah) where only the abaxial side is glaucous.

While there is an extreme dearth of information on dispersal biology of Malesian aroids generally, it is notable that Hambali (1979) records the fruits of *C. esculenta* having a distinct smell which "varies from the fragrant smell of *Pandanus amaryllifolius* Roxb. leaves to the sourish smell of acetic acid or to the smell of an overripe pineapple", the latter odour also recorded for *C. gigantea*. The seeds of both species are dispersed by Common Palm Civets in Java, though other dispersers must also be involved, at least on the Marsupial (east) side of Wallace's Line. The fruits of *Alocasia* are always brightly coloured and, as far as I am aware, odourless, suggesting a different dispersal syndrome involving birds. Indeed, it would appear that odoriferous ripe fruits are rare in herbaceous aroids generally, though fairly frequent amongst climbers, where bat-dispersal may be occurring.

COLOCASIA Schott in Schott & Endlicher, Melet. Bot. (1832) 18, [*nom. cons.*; see Dandy in Taxon 18 (1969) 464; *non Colocasia* Link, Diss. Bot. (1795) 55, *nom. rej.*, § *Zantedeschia* Spreng.]. Type species: *C. antiquorum* Schott (*Arum colocasia* L.) [= *C. esculenta* (L.) Schott], *typ. cons.*

About 8 species of mostly East and South East Asian perennial herbs. *Colocasia* includes the now pantropical (and pansubtropical) starch crop taro or *keladi*, *C. esculenta* (L.) Schott (for reviews see, e.g., Chandra 1984, Wang 1983). The range of the wild-type of this species is not known for certain, though recent evidence suggests this may include at least Indochina, Malesia and sporadically in much of tropical Australia.

KEY TO SPECIES OF *COLOCASIA* IN MALESIA AND AUSTRALIA

1. Spathe limb yellow to golden, slightly recurved; fruiting peduncle down-curved; plants in the wild colony-forming, stoloniferous ..... 1. *C. esculenta*
   Spathe limb greenish white to pale creamy yellow, erect; fruiting peduncle straight; plants in the wild solitary to clump-forming, not stoloniferous 2

2. Plants very robust, *c.* 1.5–2 m tall; leaves very glaucous; inflorescences usually several together; appendix vestigial; interpistillar staminodes absent; lowland plants (the Malay Peninsula to Java) ..... 2. *C. gigantea*
Plants less robust, to *c.* 1 m tall; leaves not glaucous (except juveniles); inflorescences usually in pairs; appendix present, interpistillar staminodes present; montane plants (Borneo) ..... 3. *C. oresbia*

Note: Many cultivars of *C. esculenta* are not stoloniferous; these are distinguished from both the other two species by the declinate fruiting peduncle (Shaw 1975: Plate I), from *C. gigantea* by the smaller size and interpistillar staminodes and from *C. oresbia* by the waxy leaf, among other characters.

1. Colocasia esculenta (L.) Schott in Schott & Endlicher, Melet. Bot. (1832) 18. Type: *Arum minus, nymphaeae foliis, esculentum* Sloane, Voy. Jamaica Nat. Hist. (1725) 2: t. 106, f.1 (see Nicolson, 1979: 456). (Fig. 1)

Arum esculentum L., Sp. Pl. (1753) 965.

Caladium esculentum (L.) Vent., Jard. Cels. (1800) t. 30.

Colocasia antiquorum var. *esculenta* Schott *ex* Seem., Fl. Vit. (1868) 284.

Colocasia antiquorum subsp. *esculenta* (L.) Haudricourt, Rev. Bot. Appl. Agr. Trop. 21 (1941) 62.

Arum colocasia L., Sp. Pl. (1753) 965. Type: 1079.4 (LINN) (see Nicolson, 1979: 457).

Colocasia antiquorum Schott in Schott & Endlicher, Melet. Bot. (1832) 18.

Caladium colocasia (L.) W.Wight *ex* Safford, Contr. U.S. Nat. Herb. 9 (1905) 206 [*nom. illeg., non Caladium colocasia* Schott *ex* Wight, Icones 3 (1844) t. 787; i.e. *Alocasia cucullata* (Lour.) G. Don].

Colocasia antiquorum var. *typica* K. Krause, Pflanzenr. 71 (IV.23E) (1920) 66 [*nom. inadmiss.*; Art. 24.3].

Colocasia esculenta var. *antiquorum* (Schott) Hubb. & Rehder, Bot. Mus. Leafl. 1 (1932) 5.

Colocasia antiquorum subsp. *antiquorum* Haudricourt, Rev. Bot. Appl. Agr. Trop. 21 (1941) 62.

Fig. 1. *Colocasia esculenta* (L.) Schott. A wild-type plant, *c.* 1 m tall, at Tambun, near Ipoh, Perak, Peninsular Malaysia (no specimen preserved).

Caladium acre R.Br., Prodr. Fl. Nov. Holl. (1810) 336. Type: R. Brown (BM: not found).

Colocasia acris (R.Br.) Schott in Schott & Endlicher, Melet. Bot. (1832) 18.

Colocasia esculenta var. *acris* (R.Br.) Schott, Syn. Aroid. (1856) 41.

Calla gaby Blanco, Fl. Filip. (1837) 659. Type: based on Blanco's description, with no material preserved; see Merrill (1918:92) where is cited an illustrative specimen (Merrill: Species Blancoanae No. 21; *n.v.*) which may serve as epitype.

Colocasia vera Hassk., Flora 25 (2), Beibl. 1 (1842) 8. Type: *Caladium sativum* Rumph., Herb. Amboin. 5 (1747) t. 109. [Plus (*loc. cit.*) vars. *pallida, minor, atroviridis, rubrinervis, scripta, atrosanguinea* and *lurida*, and in Cat. hort. bot. bog. alt. (1844) 55, vars. *polyrrhiza, viridis, intermedia, monorrhiza* and *variegata*æall *nomina subnuda* and with types not located. An early attempt at enumerating the cultivars of taro in Java.].

Colocasia esculenta var. *aquatilis* Hassk., Pl. Jav. Rar. (1848) 150. Type: *Caladium aquatile* Rumph., Herb. Amboin. 5 (1747) t.110, fig. 1.

Colocasia antiquorum var. *aquatilis* (Hassk.) Krause, Pflanzenr. 71 (IV.23E) (1920) 68.

Colocasia gracilis Engl., Bot. Jahrb. Syst. 1 (1881) 185. Type: Sumatra, Padang Province, Singalan, Beccari P.S. *s.n.* (B!, holo; FI!, iso).

DISTRIBUTION. Pantropical and pansubtropical (in areas with adequate water) through cultivationæthe common taro or *keladi*. The range prior to human distribution is unknown, but may have been widespread from Indochina to southern Japan, through Malesia and northern Australia, corresponding to the present range of "var. *aquatilis*" (see further discussion below).

HABITAT. Wild forms occur as colonies on river banks, in open swampy places, on seepage slopes and on rocks and banks in the splash-zone of waterfalls from the lowlands to *c.* 1700m altitude in the tropics.

Some authors continue to recognise varieties—or subspecies (Haudricourt 1941)—of this species, in particular var. *esculenta* and var. *antiquorum* amongst cultivated forms (not cormelliferous and cormelliferous, respectively), while Nicolson (1979, 1987) considered it hopeless to maintain taxa in such a polymorphic, plastic species. Hasskarl's varietal name "*aquatilis*" has been used (e.g., recently, Matthews 1991, 1995; Matthews *et al.* 1992) to refer to stoloniferous semi-aquatic wild type *C. esculenta*, which had much earlier been described as a separate species in Australia as *Caladium acre* R. Br. (1810). Brown's slips (BM) record that he considered this species to be the wild form of the edible taro. *Caladium acre* was later combined by Schott (1832) into *Colocasia acris* and then reduced to varietal

rank in *C. esculenta* (Schott 1856); however, Hasskarl's name has priority at varietal rank. This wild-type, which is characteristically highly acrid [see Tanimoto *et al.* (1982)—but not there with this varietal name], is quite distinctive and is found from southern Japan south to throughout Malesia and sporadically in tropical Australia. A range of recent evidence including ribosomal DNA analysis (see Matthews 1990, Matthews & Terauchi 1994) suggests that the wild types in New Guinea and Australia, which have often been assumed to be escapes from cultivation following introduction from tropical Asia, may well be indigenous [see also Carson & Okada (1980)—endemic *C. esculenta*-specific flies in New Guinea; Coates *et al.* (1988); Spriggs (1982)]. Since these appear to form a naturally occurring morphological and ecological "entity", it might seem desirable to recognise the wild-type formally as an infraspecific taxon. However, the occurrence of wild-type phenotypes of taro in Polynesia (e.g., *C. esculenta* "Nokanoka"; see Wilder 1931:27) where there is universal agreement that the species is introduced by humans (see Matthews 1995), suggests that the wild-type can eventuate by "reversion to type" on escape from cultivation. The wild-type as a taxon would therefore be derived polyphyletically both from its wild-type ancestor and from cultivated forms. Since recognising the wild-type as a taxon would require the cultivated forms to be recognised as at least one other taxon at the same rank, and since the cultivated forms are very probably derived from the wild-type several times (cf. Coates *et al.* 1988, Hotta 1983), there would be erected a classification in which two (or perhaps more) taxa were polyphyletically interderived and mutually paraphyletic. It is logical formally to recognise only a single taxon, *C. esculenta*, in which cultivars and informal "wild-type(s)" are recognized (cf. Mabberley 1984; see also Burtt 1970). Enumerating the cultivars of *C. esculenta* is an enormous and specialised task beyond the scope of this paper (see, e.g., Whitney *et al.* 1939).

Colocasia gracilis Engl. appears to be no more than a depauperate form of wild-type *C. esculenta*. For shoots to flower before achieving adult size is a common occurrence in herbaceous aroids.

2. Colocasia gigantea (Blume) Hook.*f.*, Fl. Brit. Ind. 6 (1893) 524. Type: Indonesia, Java, *Blume s.n.* (L!, holo). (Fig. 2)

Caladium giganteum Blume, Catalogus (1823) 103.

Leucocasia gigantea (Blume) Schott, Oesterr. Bot. Wochenbl. 7 (1857) 34.

[*Colocasia indica auct. non* (Lour.) Kunth: Krause, Pflanzenr. 71 (IV.23E) (1920) 69, *pro parte quoad Caladium giganteum* Blume, *Leucocasia gigantea* (Blume) Schott & *Colocasia gigantea* (Blume) Hook.*f. in synon. & quoad* fig. 11, *excl.* fig. 11A, *habitus* (i.e., *Alocasia odora* (Roxb.) K. Koch, see below)].

Fig. 2. *Colocasia gigantea* (Blume) Hook.*f.* An immature plant, *c.* 1.5 m tall, at Bogor, Indonesia (no specimen preserved).

?*Colocasia indica* var. *pallida* Hassk., Flora 25 (2), Beibl. 1 (1842) 8. Type: none designated; this variety was based on Rumphius' very short description of a third "species" of *Arum indicum sativum* Rumph., Herb. Amb. 5 (1747) 308. This is effectively a *nomen subnudum* which Furtado (1941) thought may have referred to *C. gigantea*. It is either this or a form of *Alocasia macrorrhizos* (L.) G. Don. The matter can be settled by the designation of an epitype.

DISTRIBUTION. Native from southern China and Indo-China to the Malay Peninsula, Sumatra and Java. Matthews (1991) noted records from southern Japan, and has indicated (pers. comm.) that it is widely cultivated in temperate and subtropical Japan as a summer crop, but that it is nowhere wild there. Sastrapradja & Rijanti (1972) referred to a Sumatran cultivar. Sastrapradja & Hambali (1979) note the occurrence of this species in Kalimantan, but I have not seen any material from there myself, nor from Malaysian Borneo nor Brunei.

HABITAT. In the Malay Peninsula, mainly (but not exclusively) on limestone. Chin (1982) noted that it tolerates extreme exposure and has been observed as a pioneer after fire. I have observed it growing as a lithophyte in Perlis. In Java it is a common weed in disturbed places in the lowlands and up to *c.* 1000 m. Backer & Bakhuizen (1968:121) note its occurrence in mixed and teak forests, swamps, *Imperata* fields and in cultivation.

Okada & Hambali (1989) noted that this species hybridizes with *C. esculenta*, but that the progeny are weak and sterile.

The confusion by Krause (*loc. cit.*) appears to be based on the erroneous notion that *Arum indicum* Lour. (1790) was different from *Arum indicum* Roxb. (1832). This can be traced to Schott (1857, 1860) who considered *Arum indicum* Lour. a synonym of *Leucocasia gigantea* (Blume) Schott, while *Arum indicum* Roxb. was, in his view, the basionym of *Alocasia indica* Schott. Kunth (correct taxonomically) cited both as synonyms of *"Colocasia" indica* and consequently Krause was of the opinion that *C. indica* Kunth was a mixtum, citing it as a partial synonym of *Alocasia indica*, but retaining it inasmuch as it was based on Loureiro's *Arum indicum* as (wrongly) a *Colocasia*. In fact, Roxburgh's use of the binomial was based on and virtually identical in sense to that of Loureiro. *Arum indicum* Lour., while no herbarium material has yet been located, included *Arum indicum sativum* Rumph., of which Rumphius' plate was selected as lectotype (Nicolson, 1979: 455; reproduced in Hay & Wise, 1991). This element is unequivocally *Alocasia macrorrhizos* (L.) G. Don (syn. *Alocasia indica* (Lour.) Spach; *Colocasia indica* (Lour.) Kunth).

Krause's illustration, cited above, includes analytical drawings uncontestably of *C. gigantea*. However, the plate's habit drawing shows an erect stem typical of some species of *Alocasia*, but which *C. gigantea* does not develop, combined with an arrangement of inflorescences typical of *Alocasia*. Although in the drawing the leaves are peltate as in *C. gigantea*, the petioles are relatively too long and the blades too small for this species and very closely resemble those of *A. odora*. Indeed, if the drawing was made from an actual

plant, it can only be *A. odora*, combining as it does the erect stem, peltate leaves and rather distinctive inflated cucullate spathe limb seen also in *C. gigantea*. Alternatively it may be a muddled reconstruction of the habit, incorporating *C. gigantea* together with *A. macrorrhizos*. The latter also develops an erect stem and was involved in Krause's misinterpretation of *"C. indica"* as discussed above.

3. Colocasia oresbia A. Hay **sp. nov.** *In aspectu C. gigantea affinis, sed statura valde minora, folio haud glauco, lobo antico folii geoscopico, appendice producto, lamina spathae lanceolata differt. A C. esculenta habitu estolonifero, folio haud glauco, inflorescentia femina majore, infructescentia valde grandiore, pedunculo fructifero crasso recto, fructu brunneo-viride, spathae lamina breviora pallidiora erecta differt. Typus: Hay 10046, Malaysia, Sabah, Taman Kinabalu, near Silau Silau trail to Liwagu River, 30 March 1995 (holotypus SNP [= Sabah Parks herbarium]; photo BO, K, KEP, L, NSW, SAN, SAR, UPM).* (Figs. 3 & 4)

Robust solitary or clump-forming herb; stem condensed, creeping to decumbent, clothed in marcescent leaf bases, lacking stolons, to *c.* 40 cm long, *c.* 12 cm diam., cut tissues rapidly turning rusty orange on exposure to air. Leaves several together; blades very broadly ovate-saggitate, to *c.* 60 × 50 cm, deeply peltate, somewhat glossy greyish green adaxially, paler abaxially, not waxy-glaucous (except in very young plants), wettable (not water-shedding); anterior lobe *c.* 2/3 the length of the blade, widest at the base; primary lateral veins slightly raised adaxially and abaxially, 5–6 on each side of the anterior costa, diverging at 45–90°, the divergence angle diminishing distally along the anterior costa; secondary venation flush, not forming intercostal collective veins; posterior lobes to 15 cm long, with the margins rather crisped in the sinus, peltate for over half their length, the posterior costae diverging at *c.* 50°; petiole to 80 cm long, sheathing in the lower *c.* 1/3–1/2, wings of sheath *c.* 1.5 cm wide, persistent, ± straight (i.e., not recurved or inrolled). Inflorescences produced in both juvenile and adult plants, solitary or paired; peduncles almost completely enclosed in sheath of subtending leaf, when paired the sequence perpendicular to the circumference of the stem with the younger one further out, to 25 cm long, glaucous in the upper part, the second subtended by a bicarinate lanceolate prophyll extending to half way up the spathe tube at anthesis; spathe 12–15 cm long, tube narrowly ovoid, pale glaucous green, 3.5–4 cm long, limb erect, lanceolate, 8.5–*c.* 11 cm long, pale creamy yellow, open only at base, the rest convolute. Spadix sessile, *c.* 10 cm long; female zone *c.* 3.5 × 1 cm, slightly tapering distally; pistils very numerous (*c.* 150–400), interspersed irregularly in the lower half of and at the apex of the female zone with *c.* 2.5 mm long upturned ivory staminodes containing 1–2 vestigial thecae; ovaries incompletely 3–5-locular (briefly septate at apex only) with parietal placentas and numerous sub-orthotropous ovules; style distinct but very short (less than 0.5 mm long); stigma whitish, minutely lobed, *c.* 0.5 mm diam.; sterile interstice *c.* 2 cm long, basally of staminodes distally merging with a constricted zone of much reduced elongate ivory synandrodes; male zone *c.* 2 cm long × 0.5 cm, synandria ivory, irregularly

Fig. 3. *Colocasia oresbia* A. Hay. Habit, *c.* 90 cm tall (*Hay* 10046).

Fig. 4. *Colocasia oresbia* A. Hay. Inflorescence with part of spathe removed and the spathe limb browning as it senesces. Spadix *c.* 10 cm long (*Hay* 10046).

rhombo-hexagonal *c.* 1 mm diam (after dehiscence), 2–4-staminate; appendix constricted at base, *c.* 3 cm long × 0.4 cm, tapering to a point, surface slightly and irregularly rugose. Fruiting peduncle elongating *c.* 1.5 times, straight, erect to horizontal depending on condition of subtending leaf but not actively down-curved; fruiting spadix aligned with peduncle, *c.* 10 × 4 cm, enclosed within the expanded spathe tube which dehisces from the base; fruits numbering hundreds per infructescence, green tinged brown when ripe, irregularly subglobose, containing many ovoid, longitudinally ridged, orthotropous, ivory seeds *c.* 0.75 mm long in clear thin mucilage.

DISTRIBUTION. Borneo, Sabah; known only from Gunung Kinabalu and G. Alab.

HABITAT. Disturbed, mostly rather open sites on banks and road cuttings at *c.* 1500 m alt.

OTHER SPECIMENS EXAMINED—BORNEO, SABAH: Tenompok, Kinabalu, *Clemens & Clemens 29141* (K!); Kinabalu, headwaters of Columbon R., margin of Keebamban R., nr Lobang, *Clemens & Clemens 33884* (BM!); Penampang, along rd from Agr. Exp. Station to S of G. Alab, Alab Mts, *Kokawa & Hotta 1758* (KYO, L!); Penapis, G. Alab, *Kokawa & Hotta 1934* (KYO, L!).

This species is readily distinguished from wild-type *C. esculenta* by its non-waxy, wettable leaf blades, rather long stout stem thickly clothed in old leaf bases, lack of stolons, preference for non-saturated sites, much more robust infructescence, straight fruiting peduncle and its brown-tinged green (versus yellow-orange: Barrau 1959) fruits.

Although wild forms of *C. esculenta* occur at altitudes as high as 1700 m in Java (Hambali 1977), they are not of the heavily starch-storing type. *C. oresbia* however, is a thick-stemmed high altitude species which may have some potential importance in breeding high altitude tropical *keladi* cultivars.

The specific epithet means "mountain-dwelling".

Species et varietates excludendae

1. *Colocasia devansayana* L. Linden & Rodigas, Ill. Hort. 33 (1886) 97 = *Alocasia devansayana* (L. Linden & Rodigas) Engl., Nova Guinea 8 (1912) 808. Type: Ill. Hort. *loc. cit.* t. 601.

While clearly an *Alocasia*, the type is not able to be identified with certainty. Additional material cited by Engler (*loc. cit.*) is distinctly different (see Hay & Wise 1991).

2. *Colocasia? heterophylla* (Presl) Kunth, Enum. Pl. 3 (1841) 40 = *Alocasia heterophylla*

(Presl) Merr., Philipp. J. Sci. Bot. 3 (1908) 220. (*Caladium heterophyllum* Presl, Reliq. Haenk. 2 (1835) 148). Type: Haenke *s.n.* (PR).

3. *Colocasia? humilis* Hassk., Flora 25 (2), Beibl. 1 (1842) 10. *Nom. superfl. pro Schismatoglottis calyptrata* (Roxb.) Zoll. & Moritzi, Syst. Verz. (1846) 83.

Hasskarl (*loc. cit.*) included *Arisarum esculentum* Rumphius, Herb. Amboin. 5 (1747) t.111, fig. 1—the type of *Calla calyptrata* Roxb., Fl. Ind. 3 (1832) 514—in the synonymy of *Colocasia humilis*.

4. *Colocasia humilis* var. *minor* Hassk., *loc. cit.* = ? *Schismatoglottis calyptrata* (Roxb.) Zoll. & Moritzi. Type: ?Hasskarl (?BO; not located).

Although *C. humilis* Hassk. (see above) is a synonym of *Schismatoglottis calyptrata*, it is not completely clear if var. *minor* is actually *Schismatoglottis* too. No element was cited that could serve as type, the description is very sparse and it is not indicated from where the plant is supposed to have originated. No herbarium material bearing this name has been located at L.

However, Hasskarl (1842a,b), in discussing the varieties, was clear about the specific character of the clavate appendix which does not accord with *Colocasia* in the current sense at all. It does however, accord with *Schismatoglottis calyptrata*, though also with other *Schismatoglottis* species. Hasskarl (1842a) also mentions capitate interpistillar staminodes as a character of *C. humilis* var. *minor*—another characteristic in accord with *S. calyptrata*, particularly when combined with the additional specific character of being stoloniferous (cf. Hay 1996).

5. *Colocasia humilis* var. *major* Hassk., Tijdschr. Nat. Gesch. & Physiol. 9 (1842) 160. *Nom. superfl. pro var. typ.* = *Schismatoglottis calyptrata* (Roxb.) Zoll. & Moritzi. Type: ?Hasskarl (?BO; not located).

Hasskarl's publications in Flora (1842a) and Tijdschr. Nat. Gesch. & Physiol. (1842b), cited above, appear to have been published in reverse order to that in which they seem to have been written. *C. humilis* var. *major*, designated variety α, appears in Hasskarl (1842 b; Aug./Sept.), but not in Hasskarl (1842a; July), where only var. *minor* appears, designated variety β. It is evident that Hasskarl considered var. *major* the "type" form from which var. *minor* was segregated, and not another variety in addition to an implicit var. *humilis*.

6. *Colocasia humilis* Hassk. var. *picta* Hassk., Cat. Hort. Bot. Bog. alt. (1844) 56 = ? *Schismatoglottis calyptrata* (Roxb.) Zoll. & Moritzi.

A *nomen nudum* in Hasskarl (1844), but "Exp. bant. 94" is cited. This may refer to published work on plants of Bantam, West Java, in Tijdschr. Neerl. Ind. 4(2) (1842)

126–131; 221–256 (*n.v.*; see van Steenis-Kruseman 1950: 221). This matter, together with other neo- or epitypifications in *C. humilis* if necessary, will be clarified in the context of revision of Javan *Schismatoglottis*.

7. *Colocasia indica* (Lour.) Kunth, Enum. Pl. 3 (1841) 39 = *Alocasia macrorrhizos* (L.) G. Don, Hort. Brit. ed. 3 (1839) 631. (*Arum indicum* Lour., Fl. Cochinch. (1790) 536.) Type: *Arum indicum sativum* Rumph., Herb. Amboin. 5 (1747) t. 106.

8. *Colocasia indica* var. *atroviridis* Hassk., Flora 25 (2), Beibl. 1 (1842) 8 = *Alocasia macrorrhizos* (L.) G. Don. Type: None designated; based on Rumphius' very brief description of a second "species" of *Arum indicum sativum* Rumph., Herb. Amb. 5 (1747) 308.

9. *Colocasia indica* var. *rubra* (Hassk.) Hassk., Pl. Jav. Rar. (1848) 145. = *Alocasia macrorrhizos* (L.) G. Don.

10. *Colocasia macrorrhizos* ('-rrhiza') (L.) Schott in Schott & Endlicher, Melet. Bot. (1832) 18 = *Alocasia macrorhhizos* (L.) G. Don, *loc. cit.* (*Arum macrorrhizon* L., Sp. Pl. (1753) 965.) Type: *Arum maximum macrorrhizon zeylanicum* Hermann, Parad. Bat. (1698) t. 73.

[*Colocasia macrorrhizos* ('-rrhiza') *sensu auctt.* Austral., non (L.) Schott, = *Alocasia brisbanensis* (F.M. Bailey) Domin (see Hay 1989, Hay & Wise 1991)].

11. *Colocasia? montana* (Roxb.) Kunth, Enum. Pl. 3 (1841) 40 = *Alocasia montana* (Roxb.) Schott, Oesterr. Bot. Wochenbl. 4 (1854) 410. (*Arum montanum* Roxb., Fl. Ind. 3 (1832) 497.) Type: Roxburgh drawing No. 248 (CAL, K; see Sanjappa *et al.*, 1991).

This name is probably misapplied to Malesian material (Hay *et al.* 1995).

12. *Colocasia neoguineensis* André, Ill. Hort. 27 (1880) 68, t. 380 = *Schismatoglottis neoguineensis* (André) N.E. Brown, Gard. Chron 24 (1885) 776. Type: Plate in Ill. Hort. (*loc. cit.*).

13. "*Colocasia odorata*" Hassk., Flora 25 (2), Beibl. 1 (1842) 9 = *Alocasia macrorrhizos* (L.) G. Don.

This may be interpreted as an orthographic variant of *Colocasia odora* (Roxb.) Brongn. (Nouv. Ann. Mus. Par. 3 (1834) 145, t.7; i.e. *Alocasia odora* (Roxb.) C. Koch), to be treated as if it were printed in its corrected form (Art. 61.4). Although "*odora*" and "*odorata*" are different words, Hasskarl used them interchangeably, ascribing the combination to Brongniart in either spelling. The name is misapplied to Malesian material.

14. *Colocasia odora* var. *viridis* Hassk., Flora 25 (2), Beibl. 1 (1842) 9. *Nom. superfl. pro var. typ.*; = *Alocasia macrorrhizos* (L.) G. Don.

15. *Colocasia odora* var. *rubra* Hassk. (*loc. cit.*). = *Alocasia macrorrhizos* (L.) G. Don.

16. *Colocasia pubera* Hassk., Cat. hort. bot. bog. alt. (1844) 302 = *Alocasia pubera* (Hassk.) Schott, Syn. Aroid. (1856) 47. Type: Java, ? Hasskarl *s.n.* (BO, not found).

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